CLAIMS

1. A method of modifying the structure of a workpiece, the method comprising:

1) causing relative movement between a power beam and the workpiece so that a region of the workpiece is melted and the melted material displaced to form a projection at a first location in the region and a hole at a different location in the region;

2) allowing the melted material at least partially to solidify; and thereafter

3) repeating step 1) one or more times, the region corresponding to each repeat intersecting the region of step 1).

2. A method according to claim 1, wherein step 3) further comprising repeating step 2) following each repeat of step 1).

3. A method according to claim 1 or claim 2, wherein the region is defined by the beam being caused to travel relative to the workpiece along a path from a start position to a finish position.

4. A method according to claim 3, wherein the first location is at one of the start or finish positions and the different location is at the other of the start or finish positions.

5. A method according to claim 3 or claim 4, wherein the path is at least three beam diameters in length.

6. A method according to any of the preceding claims wherein at least part of the region is elongate.

7. A method according to claim 6, wherein the region is substantially rectilinear.

8. A method according to any of claims 1 to 6, wherein at least part of the region is curved.

9. A method according to any of the preceding claims, wherein the modification comprises a modification of substantially the bulk structure of the workpiece.

10. A method according to any of the preceding claims, wherein the modification comprises a modification of substantially the surface structure of the workpiece.

11. A method according to any of the preceding claims, wherein each of the regions of step 3) coincides substantially with the region of step 1).

12. A method according to any of the preceding claims, further comprising forming one or more groups of regions, each group intersecting the region of step 1).

13. A method according to claim 12, wherein the holes of each group are substantially co-incident with the hole of the region of step 1).

14. A method according to claim 12 or claim 13, wherein the projections of each group are substantially coincident with the projection of the region of step 1).

15. A method according to any of claims 12 to 14, wherein the groups of regions are arranged in a regular array.

16. A method according to any of the preceding claims, wherein during step 2), the power beam forms one or more regions elsewhere on the workpiece.

17. A method according to any of the preceding claims, wherein the workpiece is provided with another material so that one or more alloys are formed during performance of the method.

18. A method according to any of the preceding claims, wherein steps 1)-3) are carried out in a gaseous atmosphere so that one or more alloys is formed.

19. A method according to any of the preceding claims wherein the intersecting regions are arranged so as to form projections which overhang the workpiece surface.

20. A method according to claim 19, wherein two or more overhanging projections are joined so as to form one or more loops above the workpiece surface.

21. A method according to any of the preceding claims, wherein the power beam energy density is reduced during step 3) with respect to the one or more previous movements

of the power beam, so as to smooth the edges of the projection and/or hole formed.

22. A method of preparing a workpiece in the form of a member, for joining to one or more further workpieces, comprising forming a multiplicity of holes in the surface and/or bulk of the member and forming outward projections from the member surface, using the method according to any of claims 1 to 21.

23. A method according to claim 22, wherein one or more of the size, shape or relative arrangement of the holes, and/or one or more of the size, shape, relative arrangement or chemical composition of the projections, is controlled in a predetermined manner.

24. A method according to claim 22 or claim 23, wherein the projections and/or holes are formed so as to mechanically engage with the workpiece(s) to which the member is joined.

25. A method according to claim 24, wherein the projections are arranged so as to interact with complementary structures within the workpiece(s).

26. A method according to any of claims 22 to 25, wherein the holes are of a suitable size to accommodate an adhesive or resin.

27. A method according to any of claims 22 to 26, wherein the projections and/or holes are formed such that, in use, the projections and/or holes cooperate with the workpiece(s) so as to distribute any stresses within the joint between the workpiece(s) and the member, and thereby reduce stress concentrations within the joint.

28. A method according to any of claims 22 to 27, wherein the projections and/or holes are arranged so as to provide predetermined local mechanical, physical or thermal properties.

29. A method according to claim 28, wherein the projections and/or holes are arranged in at least part of the member so as to cause the local thermal and/or mechanical properties in that part of the member to be

substantially the same as those of the workpiece(s) to which that part of the member is to be joined in use.

30. A method according to any of claims 22 to 29, wherein the projections and/or holes are arranged so as to control the manner of failure of the joint.

31. A method according to any of claims 22 to 30, wherein the member is an intermediate member for use in joining two or more further workpieces together.

32. A workpiece that has been treated using the method according to any of the preceding claims.

33. A method of joining a first workpiece to one or more further workpieces, comprising preparing the first workpiece for joining using the method according to any of claims 22 to 31, and joining the first workpiece to the one or more further workpiece(s).